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A REVISION OF THE RUDIMENTS AS CONCERNING NATURE-STUDY

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The biographers of great men appear to take a mischievous delight in showing how their subjects came up through the period of childhood virtually untutored in those studies which pass with us as the essentials of education. We learn that George Stephenson at the age of eighteen could not read; and that at nineteen he was able "to sign his name, in a good round hand." Yet, by one shift or another, he managed finally to loom large in the pages of history as one of the world's considerable figures in the field of science.

Georg Ebers is said to have been withheld by his mother from a study of printed words until his tenth year, the interim being dedicated to a free wandering among studios and craftsmen's shops, or wherever knowledge might be absorbed at first hand. Yet this Ebers figures later in life as a man of famous erudition, the great Egyptologist.

The statesman Elihu Washburn, surnamed "the Watchdog of the Treasury," as early as his seventh year was making himself generally useful on a New England farm. Says his biographer: "He went to school for a few weeks in winter and again for a few weeks in summer, but, as may be imagined, he learned very little."

Peter Cooper "attended school only two quarters, altogether." His childhood was a constant struggle for existence. Most of it was taken up, in dehairing rabbit skins in his father's hat factory.

Sir Isaac Newton, says a biographer, "at the age of twelve showed little taste for study, and managed easily to stand at the foot of his class." This poor showing, however, was evidently occasioned, not by idleness, but by his constant preoccupation in various mechanical conceits.

In the case of Abraham Lincoln his very struggles for book-learning reveal how desultory must have been his early acquisitions, and how wholly innocent his period of actual childhood must have been of that formal knowledge which is the chief concern of our elementary school; and, conversely, how his early boyhood must have been passed in those unorthodox employments and experiences which go unrecognized by the accepted course of study.

Further inquiry discovers a similar hiatus, of greater or less degree, in the boyhood of Herbert Spencer, James Watt Whittier, Howells, and U. S. Grant. And the inference is that these cases, selected at haphazard, are typical of a great number of others.

The question then arises: If so many of these typically successful men of history came up through childhood with the merest smattering of letters and numbers, in many instances acquired in a most desultory fashion, just what were those other and major factors which must have entered into their early education, to bear so ample a fruition in the later life?

The inquiry thus gravitates into a question of the rudiments. And this, in turn, hinges upon our interpretation of life. All schoolmen seem to agree that (*a*) the school should prepare for life, and that (*b*) the elementary courses of study should deal exclusively with the rudiments. But there appears to be no agreement as to what constitutes life, nor as to what studies may properly be enumerated as rudiments.

Our public-school tradition has ever held stolidly to the idea that life is summed up in vocation, and too often vocation is by the same estimate interpreted as shopkeeping. From such a basis the deduction is easily made that the list of rudiments is complete in the three R's.

Against this sordid tradition innovators have ever arisen, and will arise, whose thesis is that life is something more than vocation, and that therefore the group of rudiments reputed directly to serve vocation may not be accepted as a complete inventory, provided the school is really to prepare for life.

This more liberal interpretation of the school's responsibilities conceives life as including five general phases, ranking as co-ordinate and indispensable factors, and exhibiting claims upon the public school which cannot be repudiated except by sheer evasion. These five phases are: (1) the physical or creature life; (2) the intellectual or psychic life; (3) the home life; (4) the civic or community life; and (5) the vocational life. Each of these implies certain rudiments of study directly appropriate to itself, although they indirectly serve the others also. A complete list of these co-ordinate rudiments would seem to be: physical culture;[1] nature-study (of an extensive but not intensive order, as hereinafter indicated); music; history, literature, and civics; geography; manual arts; domestic economy; arithmetic (in a diminished proportion); and formal language (without grammar).

Our caption calls for the discussion of only one of these rudiments; and the foregoing remarks have been necessary in an attempt to orientate this subject of nature-study in the general scheme of elementary instruction.

As regards the direct aim of nature-study, I should say it is: *to inform the growing mind with innumerable sense-products, which shall now and later afford an adequate basis for intellection.*

These sense-products are variously called by psychologists "sense-percepts," "elementary ideas," etc. I have no wish to become defendant in a wrangle over terminology, so let us agree upon the exact nature of these sense-products by citing examples: they include all the objective phases which function in our nouns, adjectives, and verbs; and all of the external situations whence arise our figures of speech. Thus, "green," "warm," "sweet," "heavy," "brittle;" "rise," "expand," "glow," "freeze," "grind;" "iron," "apple," "shovel," and so on, *ad infinitum,* as unnumbered as the fish in the sea. We say that "Mr. So-and-so is in buoyant spirits today." But these words can function in the mind of the hearer only as he has witnessed the suspension of a cork in the water or a balloon in the air. Now, this observation of the cork or the balloon is nature-study. Out of such observations, repeated without number and in infinite variety, we amass our intellectual small coin in which all the affairs of the mind are transacted. And let us observe again that the first step in the whole process is nature-study, and the first activity is sense-activity.

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[1] Including attention by the school authorities to sanitation and hygiene.

These sense-products, then, as innumerable as the leaves of the forest, are the currency of the mind, those units of imagery in the total absence of which no intellection could proceed. Absolutely our whole vocabulary functions directly or indirectly in them, and they instruct our every conscious act. In copious supply and intricate relationships they lie at call in the antechambers of the mind, instantly ready to come before the footlights into the focus of consciousness. The barren mind is barren in the degree of its poverty of this elemental equipment. No man can come to Shakspere, or Milton. or the Bible, with appreciation and understanding, except as he is richly equipped with these elements of imagery.

This raw stuff of the imagination we must have, in no restricted measure, if we are to be numbered as sentient human beings. And it must exhibit those well-ordered relationships which facilitate judgment and choice. The raw stuff must not only be there, but it must also be mobilized with a degree of readiness that is brought about only through much use. Such a power has the artist, the poet, the general, the acrobat, the captain of industry, the statesman—each of them, as we say, "a man of imagination."

As to the origin of these elements of imagery there are just two possibilities: either we possess them as a heritage at birth, or we must acquire them by an untrammeled sense-activity continuing at least throughout the period of childhood. And this activity needs an exceeding range, but no particular intensiveness. The nature-study in vogue at present tends, I think, to reverse this proportion, through studies which are insignificant in their scope and, on the other hand, unprofitably logical and intensive. If we believe, with Comenius, in this connection, that "there can be nothing in the understanding which was not first in the senses," then it becomes our most immediate concern to consider by what means and method this mental stock may be most liberally secured to the pupil. Our public-school children do not finger enough substances with a discriminating touch; they do not gaze observantly upon enough colors and forms, and physical and chemical changes; they do not listen, in a conscious discrimination, to enough sounds; they do not lift enough weights, or constrain enough resisting bodies. We try to substitute the cold type of textbooks and readers for this foundation platform of sense-products. But the books are useless until an apperceptive basis of millions of interrelated sense-percepts is established. We trust to the god of chance for the furnishing of this apperceptive mass, and at that point education ceases to be a science. Right there we begin to elicit unfunctioned words from the pupil, and give him his first lesson in lying. That is the burden of psychological miscalculation which has ever weighed upon our teachers' efforts, and is weighing upon them today.

The remedy lies in less reading—or rather a postponed reading; less bandying back and forth of unfunctioned or only half-functioned words, and more of a constructive manipulation of objects, more intent looking at spaces, forms, and colors, more listening to characteristic sounds, and more language lessons based directly upon the resulting mental states. This enriching of the apperceptive data one man calls nature-study; another, manual training; another, object-lessons; another, industrial education; and so on. But what is there in a name? Call it what you will; it is simply letting the pupil loose once more into a normal environment from which it appears the school's chief business, at present, to withhold him.

I protest against this question being swept aside with the assertion that the mind becomes sufficiently informed with these elements of imagery before the child's entry into school, and during the recesses of the school life. It is in every probability far from the truth, more particularly in the great cities. And this view is amply borne out in the standard complaint of our various high-school teachers, who find the graduates of the elementary school vacant of mind and quite impermeable to the excellences of fine literature, or artistic presentations of any sort; while the laboratory men complain equally that the entering pupils display no gumption in the handling of materials and apparatus. In a word, the lower-school graduate has given so many of his eight thousand hours[2] to the mastery and re-mastery, and again the re-mastery, of the three R's that there are sounding echoes in those chambers of his mind which should be filled with working material. He breaks an inordinate number of test-tubes because he has a too vague conception of the frangibility of glass. His crude notions of weights and measures, and stresses, strains, and proportions, mark him as a very clown in those little exigencies where his benchmate, perchance, having the boon of a normal childhood behind him, proves adept. He mars the schoolhouse and its furniture with jackknife and pencil, and is arraigned for malicious mischief. But the truth of the matter is that he merely does not possess those standards of the general fitness of things which are acquired through much constructive sense-activity among the simple forms of the objective world.

The great obstacles toward the rationalizing of our public-school work are, first, the inordinate proportion of time given to formal language and number, and, second, the resulting popular cry of "overcrowded course of study." The latter is that destructive *vox populi* which frightens the superintendent out of the course which his common-sense dictates. It sanctifies the teacher of the traditional type, whose ideal of professional service is to live out a life-tenure with the least possible exertion. And it paralyzes the initiative of the opposite type, who struggles unconfidently against the rigidity of her circumstances.

If these reflections are at all in keeping with reason, they seem to imply the following steps toward a readjustment of the course of study:

1. Reduce the time allotment of the three R's. Give formal

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[2] The public-school course consumes 8,000 hours: 8 years of 40 weeks of 25 hours.

language and number their due, but not three times their due. For the rest of the eight thousand hours either enrich the pupil's life by a recourse to the other rudiments, or turn him loose to seek that enrichment, as Newton did, in his own devices.

2. Disabuse the teacher's mind of the moss-grown fallacy that formal language and arithmetic are the only rudiments; or even that they legitimately take precedence among the rudiments.

3. In the enriching material introduced as the media of the other rudiments, correct that tendency toward intensive study wherein the adult reads his own special interests, aptitudes, and intellectual necessities into the mind of the child. Let the subject-matter of elementary instruction be more broadly inclusive than it has been, and in a less degree intensive.

This latter stipulation implies my final proposition, as to the content of nature-study. I limit the term to a diffuse and juvenile sense-activity, as something different from, and antecedent to, those intensive and logically pursued studies which fall under the head of natural science. The pupil must rove afield, and see grass and flowers, and hear the birds sing. He must sail a boat and fly a kite. He must whittle a stick and mold a lump of clay. He must draw and paint, in a hundred different aspects of form and color, and light and shade. He must construct, in paper and wood, and tin, and putty, and glass, and rubber, and all available sorts of matter. He must fashion the boat he sails, and frame the kite he flies. A good half of the manual arts, as available for the elementary school, will be merely these little constructive enterprises, in exemplification of his nature-study.

It is apparent that we can no more specify the exact number of sense-percepts to be secured to the pupil than we can designate the precise number of words which shall constitute his vocabulary. It would sound the knell of human growth if we could to this extent crystallize elementary study. The most successful teachers, those whose beneficence weaves itself into the lifelong remembrance and affection of their pupils, will probably say: "The more the merrier, and God save the little chap who gets least."